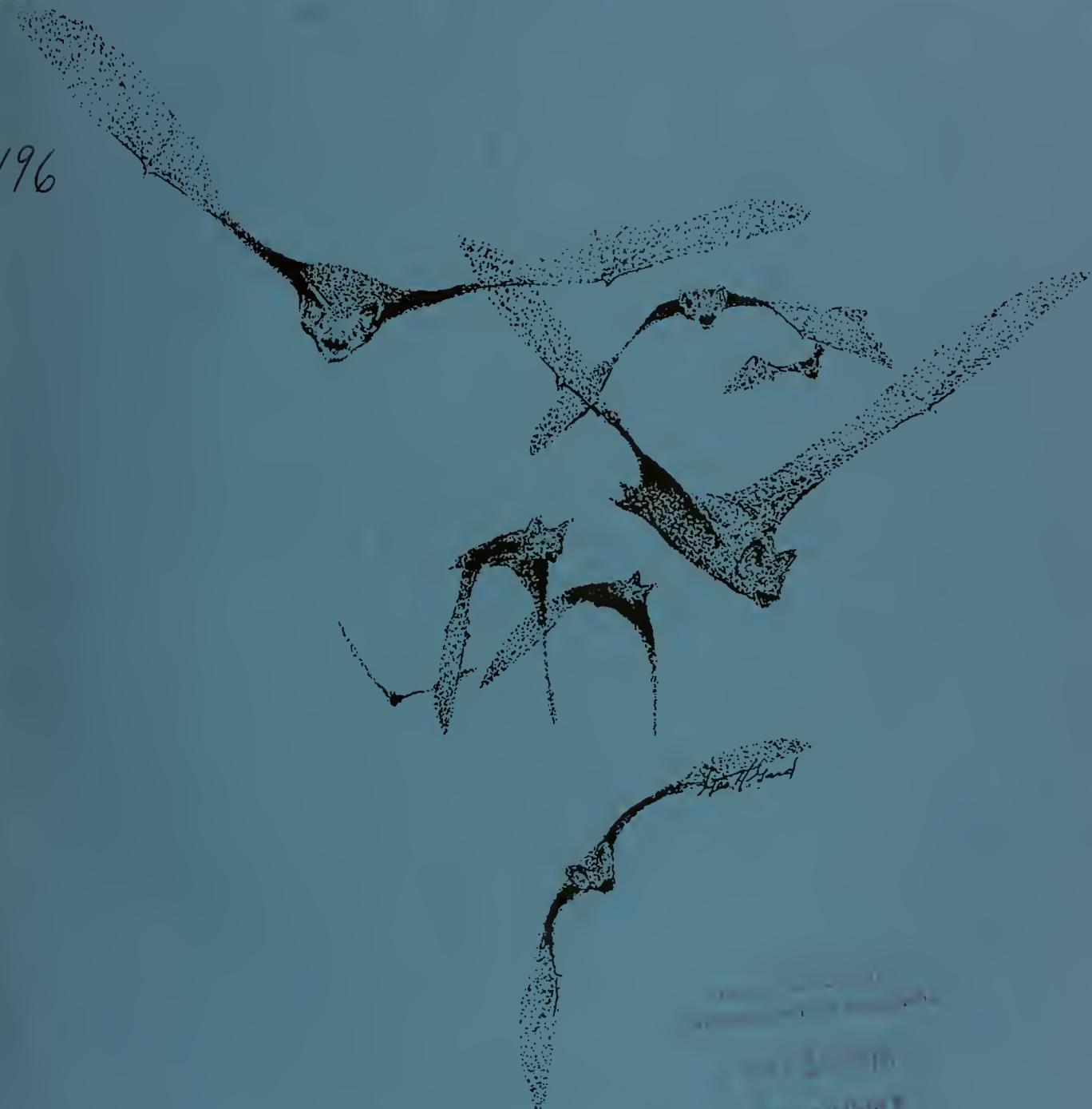


BOSTON PUBLIC LIBRARY

3 9999 06317 771 9

# THE INDIANA BAT: A BIBLIOGRAPHY

196



UNITED STATES DEPARTMENT OF INTERIOR  
FISH AND WILDLIFE SERVICE  
Special Scientific Report—Wildlife No. 196

**Library of Congress Cataloging in Publication Data**

Engel, James M

The Indiana bat, *Myotis sodalis*.

(Special scientific report—wildlife; no. 196)  
Includes indexes.

1. *Myotis sodalis*—Bibliography. I. Title. II. Series: United States. Fish and Wildlife Service.

Special scientific report—wildlife; no. 196.

SK361.A256 no. 196 [Z7997.B3] [QL737.C595]

639'.97'90973s [016.599'4] 76-8023

UNITED STATES DEPARTMENT OF THE INTERIOR  
Fish and Wildlife Service

THE INDIANA BAT, *Myotis sodalis*  
A BIBLIOGRAPHY

by

James M. Engel

U.S. Fish and Wildlife Service  
Twin Cities, Minnesota 55111



Special Scientific Report—Wildlife No. 196  
Washington, D.C. 1976



## ABSTRACT

A review of the literature on the Indiana bat, Myotis sodalis was made and cross-referenced to thirteen major topics:

- General
- Behavior
- Collecting, Banding and Trapping
- Conservation
- Distribution and Status
- Ecology
- Habitat and Habitat Selection
- Hibernation
- Homing, Migration and Seasonal Movements
- Longevity
- Population Decline, Causes of
- Reproduction
- Taxonomy

An author index is included.

## TABLE OF CONTENTS

	Page
INTRODUCTION .....	1
BIBLIOGRAPHY .....	2
SUBJECT INDEX .....	9
AUTHOR INDEX .....	11

## INTRODUCTION

The Indiana bat, Myotis sodalis, is classified by the Department of the Interior as an endangered species. In developing a plan that will enable recovery of the bat from its endangered predicament, an extensive search was made for literature concerning the species. This compilation is intended as an aid to biologists and conservationists interested in the animal and its habitats; it is hoped the bibliography will serve as a directory to available information and assist in research efforts on the animal.

An attempt has been made to include reports and papers dealing with all aspects of the species, and, therefore, a number of papers included have not been published. Each numbered item in the bibliography has been read and its contents indexed and cross referenced by subject.

Acknowledgments: I thank Ms. Dianne Pearson and Ms. Eileen Bartels for the many hours they have spent assisting in typing and gathering literature.

## BIBLIOGRAPHY

1. Allen, G. M. 1967. Bats. Dover Pub., Inc., New York. 368 pp.
2. Anon. 1975. Describes bat destruction in Utica mine. Outdoor High-lights, Ill. Dept. Conser. 3(5).
3. Baker, R. J. and J. L. Patton. 1967. Karyotypes and karyotypic variation of North American Vespertilionid bats. J. Mammal. 48(2): 270-286.
4. Barbour, R. W., W. H. Davis, and M. D. Hassell. 1966. The need of vision in homing by Myotis sodalis. J. Mammal. 47(2):356-357.
5. Barbour, R. W. and W. H. Davis. 1969. Bats of America. Univ. Press, Lexington, Ky. 286 pp.
6. Black, J. D. 1934. Myotis grisescens and Myotis sodalis in Arkansas. J. Mammal. 15(1):67-68.
7. Black, J. D. 1936. Mammals of Northwestern Arkansas. J. Mammal. 17(1):29-35.
8. Bureau of Sport Fisheries and Wildlife. 1973. Threatened wildlife of the United States. U. S. Fish Wildl. Resour. Pub. 114 (Revised No. 34):209.
9. Cockrum, E. L. 1955. Homing, movements, and longevity of bats. J. Mammal. 37(1):48-57.
10. Cope, J. B., A. R. Richter, and R. S. Mills. 1974. A summer concentration of the Indiana bat, Myotis sodalis, in Wayne County, Indiana. Proc. Indiana Acad. Sci. 83:482-484.
11. Davis, R. 1966. Homing performance and homing ability in bats. Ecol. Monogr. 36(3):201-237.
12. Davis, W. H. and W. Z. Lidicker, Jr. 1955. M. sodalis in Wisconsin. J. Mammal. 36(4):567.
13. Davis, W. H. 1964. Fall swarming at (of) bats at Dixon Cave, Kentucky. Natl. Speleol. Soc. 26(2):82.83.
14. Davis, W. H. and R. W. Barbour. 1965. The use of vision in flight by the bat Myotis sodalis. Amer. Midl. Nat. 74(2):497-499.
15. Davis, W. H. and R. W. Barbour. 1970. Homing in blinded bats. J. Mammal. 51(1):182-184.

16. DeBlase, A. F., S. R. Humphrey, and K. S. Drury. 1965. Cave flooding and mortality in bats in Wind Cave, Kentucky. *J. Mammal.* 46(1):96.
17. Easterla, D. A. and L. C. Watkins. 1969. Pregnant M. sodalis in Northwestern Missouri. *J. Mammal.* 50(2):372-373.
18. Engel, J. M., R. E. Mumford, R. L. Martin, J. R. Messerli, F. R. Courtsal, T. H. Hooper, and L. E. Terry. 1975. Recovery plan for the Indiana bat. U. S. Fish Wildl. Serv. (in prep.)
19. Fenton, M. B. 1966. M. sodalis in caves near Watertown, New York. *J. Mammal.* 47(3):526.
20. Findley, J. S. 1972. Phenetic relationships among bats of the genus Myotis. *Syst. Zool.* 21(1):31-52.
21. Folk, G. E., Jr. 1940. Shift of population among hibernating bats. *J. Mammal.* 21(3):306-315.
22. Forman, G. L. 1968. Comparative gross morphology of spermatozoa of two families of North American bats. *Univ. Kans. Sci. Bull.* 47(16):901-928.
23. Gates, W. H. 1936. Keeping bats in captivity. *J. Mammal.* 17(3):268-273.
24. Glass, B. P. 1955. New records for bats in Oklahoma. *J. Mammal.* 36(1):128.
25. Glass, B. P. and C. M. Ward. 1959. Bats of the genus Myotis from Oklahoma. *J. Mammal.* 40(2):194-201.
26. Goodpaster, W. and D. F. Hoffmeister. 1950. Bats as prey for mink in Kentucky cave. *J. Mammal.* 31(4):457.
27. Greenhall, A. M. and J. L. Paradiso. 1968. Bats and bat banding. *U. S. Fish Wildl. Resour. Pub.* 72:41.
28. Greenhall, A. M. 1973. Indiana bat, a cave-dweller in trouble. *Natl. Parks Conserv. Mag.* 47(8):14-17 (August 1973).
29. Griffin, D. R. 1940a. Migration of New England bats. *Bull. Mus. Comp. Zool.* 86(6):217-246.
30. Griffin, D. R. 1940b. Notes on the life histories of New England cave bats. *J. Mammal.* 21(2):181-187.
31. Griffin, D. R. 1945. Travels of banded cave bats. *J. Mammal.* 26(1):15-23.

32. Guthrie, M. J. 1933a. Notes on the seasonal movements and habits of some cave bats. *J. Mammal.* 14(1):1-19.
33. Guthrie, M. J. 1933b. The reproductive cycles of some cave bats. *J. Mammal.* 14(3):199-216.
34. Hall, J. S. 1960. A life history and taxonomic study of the Indiana bat, Myotis sodalis. Ph.D. Thesis, Univ. Ill. 129 pp.
35. Hall, J. S. 1962. A life history and taxonomic study of the Indiana bat, Myotis sodalis. Reading Pub. Mus. and Art Gallery Sci. Pub. 12. 68 pp.
36. Hall, J. S. 1964. Bat hibernation in the Mammoth Cave region of Kentucky. *Natl. Speleol. Soc.* 26(2):83.
37. Hall, J. S. and F. J. Brenner. 1968. Summer netting of bats at a cave in Pennsylvania. *J. Mammal.* 49(4):779-781.
38. Hall, J. S. 1972. The status of M. sodalis, the Indiana bat in West Virginia. *W. Va. Nat. Res. Spec. Bull.*, August. 4 pp.
39. Hall, J. S. 1975. The status of the Indiana bat in the Monongahela National Forest. *Wayne-Hoosier Natl. For., Spec. Rep.*
40. Hardin, J. W. 1967. Waking periods and movement of Myotis sodalis. Master's Thesis, Univ. Ky. 31 pp.
41. Hardin, J. W. and M. D. Hassell. 1970. Observation on waking periods and movements of M. sodalis during hibernation. *J. Mammal.* 51(4):829-831.
42. Hassell, M. D. 1963. A study of homing in the Indiana bat. *Trans. Ky. Acad. Sci.* 24(1-2):1-4.
43. Hassell, M. D. and M. J. Harvey. 1965. Differential homing in Myotis sodalis. *Amer. Midl. Nat.* 74(2):501-503.
44. Hassell, M. D. 1969. Intra-cave activity of four species of bats hibernating in Kentucky. Ph.D. Thesis, Univ. Ky. 65 pp.
45. Henshaw, R. E. 1965. Physiology of hibernation and acclimatization in two species of bats. Ph.D. Thesis, Univ. Iowa.
46. Henshaw, R. E. and G. E. Folk, Jr. 1966. Relation of thermo-regulation to seasonally changing microclimate in two species of bats (Myotis lucifugus and Myotis sodalis). *Physiol. Zool.* 39(3):223-236.
47. Henshaw, R. E. 1970. Thermoregulation in bats. (in) About bats, a chiropteran biology symposium. S. Methodist Univ. Press, Dallas, Texas. 188-232.

48. Henshaw, R. E. 1972. Niche specificity and adaptability in cave bats. *Natl. Speleol. Soc.* 34(2):61-70.
49. Herreid, Clyde F., II. 1964. Bat longevity and metabolic rate. *Exptl. Gerontol.* 1(1):1-9.
50. Humphrey, S. R. 1972. Conservation approaches directed by bat biology patterns. *Third No. Am. Symp. Bat Res.*, San Diego, Cal. 1 p.
51. Humphrey, S. R., J. B. Cope, A. R. Richter, and P. P. Humphrey. 1974. Summer ecology of the endangered Indiana bat. *Fifth No. Am. Symp. Bat Res.* Texas Tech. Univ. 1 p.
52. Humphrey, S. R. 1975. Nursery roosts and community diversity of Nearctic bats. *J. Mammal.* 56(2):321-346.
53. Humphrey, S. R. 1975. Status, winter habitat, and management of the endangered Indiana bat. (in prep.)
54. Husar, J. 1975. Cavers find new "sport": shooting, torching of bats. *Chic. Trib.* 19 March, Sec. 4:3.
55. Jennings, W. L. and J. N. Layne. 1957. M. sodalis in Florida. *J. Mammal.* 38(2):259.
56. Jones, J. K., Jr., E. D. Fleharty and P. B. Dunnigan. 1966. The distribution status of bats in Kansas. *Mus. Natl. Hist., Univ. Kans. Misc. Pub.* 46:1-33.
57. Jones, C. 1971. The status of populations of bats in the United States. *Second Ann. Symp. Bat Res.*, Albuquerque, New Mexico (unpublished).
58. Kirkpatrick, C. M. and C. H. Conaway. 1948. Some notes on Indiana mammals. *Amer. Midl. Nat.* 39(1):130.
59. Kunz, T. H. and D. A. Schlitter. 1968. An annotated checklist of bats from Iowa. *Trans. Kans. Acad. Sci.* 71(2):166-175.
60. Larson, K. D. 1975. New hope for endangered bat. *Great Lakes Region News, U. S. Fish Wildl. Serv.*, Minneapolis, Minn., 2 pp.
61. LaVal, R. K. 1967. Records of bats from the Southeastern United States. *J. Mammal.* 48(4):645-648.
62. LaVal, R. K. 1970. Infraspecific relationships of bats of the species Myotis austroriparius. *J. Mammal.* 51(3):542-552.
63. Layne, J. N. 1958. Notes on mammals of southern Illinois. *Amer. Midl. Nat.* 60(1):219-254.

64. Lee, D. S., and M. D. Tuttle. 1970. Old Indian Cave: Florida's first bat sanctuary. *Fla. Nat.* 43(4):150-152.

65. Lidicker, W. Z., Jr. and W. H. Davis. 1965. Changes in splenic weight associated with hibernation in bats. *Proc. Soc. Exp. Biol. Med.* 89:640-642.

66. Lyon, M. W., Jr. 1936. Mammals of Indiana. *Amer. Midl. Nat.* 17(1): 66-67.

67. Martin, R. L. 1973. The current status of bat protection in the United States of America. *Period. Biol.* 75(1):153-154.

68. Metzger, B. 1956. Partial albinism in Myotis sodalis. *J. Mammal.* 37(4):546.

69. Miller, G. S., Jr. and G. M. Allen. 1928. The American bats of the genera Myotis and Pizonyx. *U. S. Natl. Mus. Bull.* 144:218.

70. Mohr, C. E. 1932. Myotis griseescens and Myotis sodalis in Tennessee and Alabama. *J. Mammal.* 13(3):272-273.

71. Mohr, C. E. 1933. Observations on the young of cave-dwelling bats. *J. Mammal.* 14(1):49-53.

72. Mohr, C. E. 1952. A survey of bat banding in North America, 1932-1951. *Natl. Speleol. Soc. Bull.* No. 14, 14:3-13.

73. Mohr, C. E. 1972. The status of threatened species of cave-dwelling bats. *Natl. Speleol. Soc.* 34(2):33-37.

74. Muir, T. J. and E. Polder. 1960. Notes on hibernating bats in Dubuque County caves. *Proc. Iowa Acad. Sci.* 67:602-606.

75. Mumford, R. E. and J. B. Cope. 1958. Summer records of Myotis sodalis in Indiana. *J. Mammal.* 39(4):586-587.

76. Mumford, R. E. and L. L. Calvert. 1960. Myotis sodalis evidently breeding in Indiana. *J. Mammal.* 41(4):512.

77. Mumford, R. E. and J. B. Cope. 1964. Distribution and status of the chiroptera of Indiana. *Amer. Midl. Nat.* 72(2):473-489.

78. Mumford, R. E. 1969. Distribution of the mammals of Indiana. *Ind. Acad. Sci. Monogr.* 1. 114 pp.

79. Mumford, R. E. 1974. The status of the Indiana bat and the eastern wood rat on the Wayne-Hoosier National Forest, Indiana. *Dep. For. and Conserv., Purdue Univ. (special report)*.

80. Myers, R. F. 1964. Ecology of three species of myotine bats in the Ozark Plateau. Ph.D. Thesis, Univ. Mo. 210 pp.

81. Myers, R. F. 1969. Population trends of Ozark bats. Natl. Speleol. Soc., 31(2):44-45.

82. Myers, R. F. 1975. Effect of seismic blasting on hibernating Myotis sodalis. U. S. Army Corps Eng., St. Louis, Mo. Rept. LMSSD 75-1536. 34 pp.

83. Osgood, F. L., Jr. 1938. The mammals of Vermont. J. Mammal. 19(4):436.

84. Paradiso, J. L. and A. M. Greenhall. 1967. Longevity records for American bats. Amer. Midl. Nat. 78(1):251.

85. Patterson, A. P. and J. W. Hardin. 1969. Flight speeds of five species of vespertilionid bats. J. Mammal. 50(1):152-153.

86. Pearson, E. W. and T. R. B. Barr. 1962. Absence of rabies in some bats and shrews from southern Illinois. Trans. Ill. State Acad. Sci. 55(1):35-37.

87. Ramage, M. C. 1947. Notes on keeping bats in captivity. J. Mammal. 28(1):60-62.

88. Rippy, C. L. 1965. The baculum in Myotis sodalis and Myotis austroriparius austroriparius. Trans. Ky. Acad. Sci. 26(1-2): 19-21.

89. Sealander, J. A., Jr. and H. Young. 1955. Preliminary observations on the cave bats of Arkansas. Ark. Acad. Sci. 7:21-31.

90. Sealander, J. A., Jr. 1956. A provisional check-list and key to the mammals of Arkansas. Amer. Midl. Nat. 56(2):263.

91. Sealander, J. A., Jr. 1960. Some noteworthy records of Arkansas mammals. J. Mammal. 41(4):525-526.

92. Slaughter, B. H. and D. W. Walton, Ed. 1970. About bats (a chiropteran biology symposium). S. Methodist Univ. Press, Dallas, Texas. 339 pp.

93. Stones, R. C. and L. P. Branick. 1969. Use of hearing in homing by two species of Myotis bats. J. Mammal. 50(1):157-160.

94. U. S. Fish and Wildlife Service. 1974. United States list of endangered fauna. 22 pp.

95. Whitaker, J. O., Jr., W. A. Miller, and W. L. Boyko. 1969. Rabies in Indiana bats. Proc. Indiana Acad. Sci. 78:447-456.
96. Whitaker, J. O., Jr. and R. E. Mumford. 1971. Notes on a collection of bats taken by mist-netting at an Indiana cave. Amer. Midl. Nat. 85(1):277-279.
97. Whitaker, J. O., Jr. and R. E. Mumford. 1971. Notes on occurrence and reproduction of bats in Indiana. Proc. Indiana Acad. Sci. 81:376-382.
98. Whitaker, J. O., Jr. 1972. Food habits of bats from Indiana. Can. J. Zool. 50(6):877-883.
99. Whitaker, J. O., Jr. 1973. External parasites of bats of Indiana. J. Parasitol. 59(6):1148-1150.
100. Whitaker, J. O., Jr. and W. A. Miller. 1973. Rabies of Indiana: 1968-1972. Proc. Indiana Acad. Sci. 83:469-472.
101. Whitaker, J. O., Jr. 1975. Bats of the caves and mines of the Shawnee National Forest of southern Illinois. U. S. For. Serv. (Shawnee Natl. For.) Spec. Rep. 43 pp.
102. White, J. 1974. Preservation values of the Commonwealth Edison land including Pecumsaugan Creek and Blackball Mine in LaSalle County, Illinois. Ill. Nat. Preserves Commission. 13 pp.
103. Williams, R. R. 1962. Trematodes from the cave bat, Myotis sodalis. Ohio J. Sci. 62(5):273.
104. Wimsatt, W. A. 1970. Biology of bats. Academic Press, New York. 2 vols.

## SUBJECT INDEX

### General

1, 5, 18, 28, 34, 35, 80, 92, 104

### Behavior

13, 14, 23, 28, 30, 32, 33, 34, 35, 40, 41, 44, 51, 75, 78, 80, 82, 85, 87, 93

### Collecting, Banding and Trapping

4, 9, 19, 27, 29, 30, 31, 34, 35, 37, 41, 42, 43, 44, 56, 72, 73, 75, 80, 84, 89, 96

### Conservation

8, 18, 28, 39, 50, 53, 60, 64, 67, 73, 94, 102

### Distribution and Status

6, 7, 8, 12, 16, 17, 18, 19, 21, 24, 25, 30, 32, 34, 35, 37, 38, 39, 41, 42, 48, 53, 55, 56, 57, 58, 59, 61, 63, 64, 66, 70, 71, 74, 75, 77, 78, 79, 80, 81, 83, 89, 90, 91, 100, 101, 102

### Ecology

32, 34, 35, 51, 52, 80, 86, 89, 95, 97, 98, 99, 103

### Habitat and Habitat Selection

5, 10, 17, 30, 32, 34, 35, 40, 41, 44, 48, 51, 53, 80

### Hibernation

1, 5, 21, 32, 34, 35, 36, 40, 41, 44, 45, 46, 47, 65, 80, 82

### Homing, Migration and Seasonal Movements

1, 4, 5, 11, 13, 14, 15, 29, 31, 32, 34, 35, 37, 40, 41, 42, 43, 44, 51, 75, 79, 100

### Longevity

9, 49, 72, 84

Population Decline, Causes of

2, 8, 16, 18, 23, 26, 28, 34, 35, 53, 54, 57, 73, 102

Reproduction

1, 5, 17, 33, 34, 35, 44, 51, 75, 76, 77, 78, 80, 100

Taxonomy

3, 20, 22, 34, 62, 66, 68, 69, 77, 88

## AUTHOR INDEX

Allen, G. M. .... 1,69  
 Anon ..... 2  
 Baker, R. J. .... 3  
 Barbour, R. W. .... 4,5,14,15  
 Barr, T. R. B. .... 86  
 Black, J. D. .... 6,7  
 Boyko, W. L. .... 95  
 Branick, L. P. .... 93  
 Brenner, F. J. .... 37  
 Bureau of Sport Fisheries  
 and Wildlife ..... 8  
 Calvert, L. L. .... 76  
 Cockrum, E. L. .... 9  
 Conaway, C. H. .... 58  
 Cope, J. B. .... 10,51,75,77  
 Courtsal, F. R. .... 18  
 Davis, R. .... 11  
 Davis, W. H. .... 4,5,12,13  
 14,15,65  
 DeBlase, A. F. .... 16  
 Dunnigan, P. B. .... 56  
 Drury, K. S. .... 16  
 Easterla, D. A. .... 17  
 Engel, J. M. .... 18  
 Fenton, M. B. .... 19  
 Findley, J. S. .... 20  
 Fleharty, E. D. .... 56  
 Folk, G. E., Jr. .... 21,46  
 Forman, G. L. .... 22  
 Gates, W. H. .... 23  
 Glass, B. P. .... 24,25  
 Goodpaster, W. .... 26  
 Greenhall, A. M. .... 27,28,84  
 Griffin, D. R. .... 29,30,31  
 Guthrie, M. J. .... 32,33  
 Hall, J. S. .... 34,35,36,37  
 38,39  
 Hardin, J. W. .... 40,41,85  
 Harvey, M. J. .... 43  
 Hassell, M. D. .... 4,41,42  
 43,44  
 Henshaw, R. E. .... 45,46,47,48  
 Herreid, C. F., II. .... 49  
 Hoffmeister, D. F. .... 26  
 Hooper, T. H. .... 18  
 Humphrey, P. P. .... 51  
 Humphrey, S. R. .... 16,50,51  
 52,53  
 Husar, J. .... 54  
 Jennings, W. L. .... 55  
 Jones, C. .... 57  
 Jones, J. K., Jr. .... 56  
 Kirpatrick, C. M. .... 58  
 Kunz, T. H. .... 59  
 Larson, K. D. .... 60  
 LaVal, R. K. .... 61,62  
 Layne, J. N. .... 55,63  
 Lee, D. M. .... 64  
 Lidicker, W. Z., Jr. .... 12,65  
 Lyon, M. W., Jr. .... 66  
 Martin, R. L. .... 18,67  
 Messerli, J. R. .... 18  
 Metzger, B. .... 68  
 Miller, G. S., Jr. .... 69  
 Miller, W. A. .... 95  
 Mills, R. S. .... 10  
 Mohr, C. E. .... 70,71,72,73  
 Muir, T. J. .... 74  
 Mumford, R. E. .... 18,75,76,77  
 78,79,96,100  
 Myers, R. F. .... 80,81,82  
 Osgood, F. L., Jr. .... 83  
 Paradiso, J. L. .... 27,84  
 Patterson, A. P. .... 85  
 Patton, J. L. .... 3  
 Pearson, E. W. .... 86  
 Polder, E. .... 74  
 Ramage, M. C. .... 87  
 Richter, A. R. .... 10,51  
 Rippy, C. L. .... 88  
 Sealander, J. A., Jr. .... 89,90,91  
 Schlitter, D. A. .... 59  
 Slaughter, B. H. .... 92  
 Stones, R. C. .... 93  
 Terry, L. E. .... 18  
 Tuttle, M. D. .... 64  
 U. S. Fish and Wildlife  
 Service .... 94  
 Walton, D. M. .... 92  
 Ward, C. M. .... 25  
 Watkins, L. C. .... 17  
 Whitaker, J. O., Jr. .... 95,96,97,98  
 99,100,101  
 White, J. .... 102  
 Williams, R. R. .... 103  
 Wimsatt, W. A. .... 104  
 Young, H. .... 89





UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
EDITORIAL OFFICE  
AYLESWORTH HALL, CSU  
FORT COLLINS, COLORADO 80523

POSTAGE AND FEES PAID  
U.S. DEPARTMENT OF THE INTERIOR  
INT 423

